



Report of the Biodiesel Workgroup

CA Energy Commission

October 12, 2004

Sacramento, CA



Biodiesel: What Is It?

- ◆ Domestically produced, renewable fuel.
- ◆ Made from vegetable oils, animal fats, and used cooking oils.
- ◆ Produced using simple methods.
- ◆ Used in internal combustion engines (i.e. diesel engines).
- ◆ Must meet ASTM D6751.



Biodiesel: How's It Made?

(Raw Material)

Oil or Fat

Soybean

Corn

Canola

Cottonseed

Sunflower

Beef tallow

Pork lard

Used cooking oils

Alcohol

Methanol

Ethanol

Catalyst

Sodium hydroxide

Potassium hydroxide



Biodiesel: CA Production-Distribution

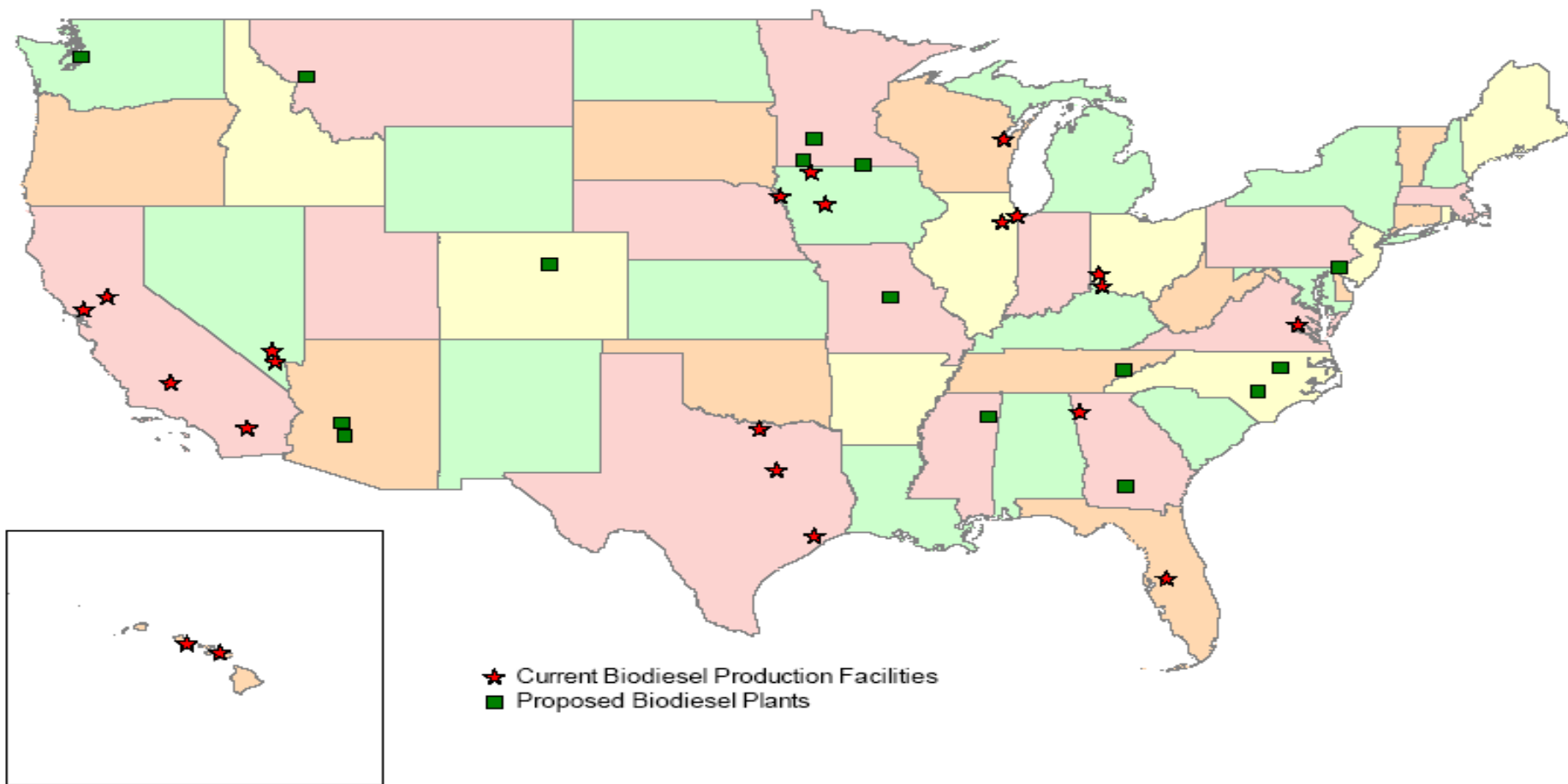
- ◆ 4 Production Facilities.
- ◆ 29 Distributors (primarily petroleum distributors).
- ◆ 23 Retail Outlets



Biodiesel: Production Facilities

Current and Proposed Biodiesel Production Plants

July, 2004



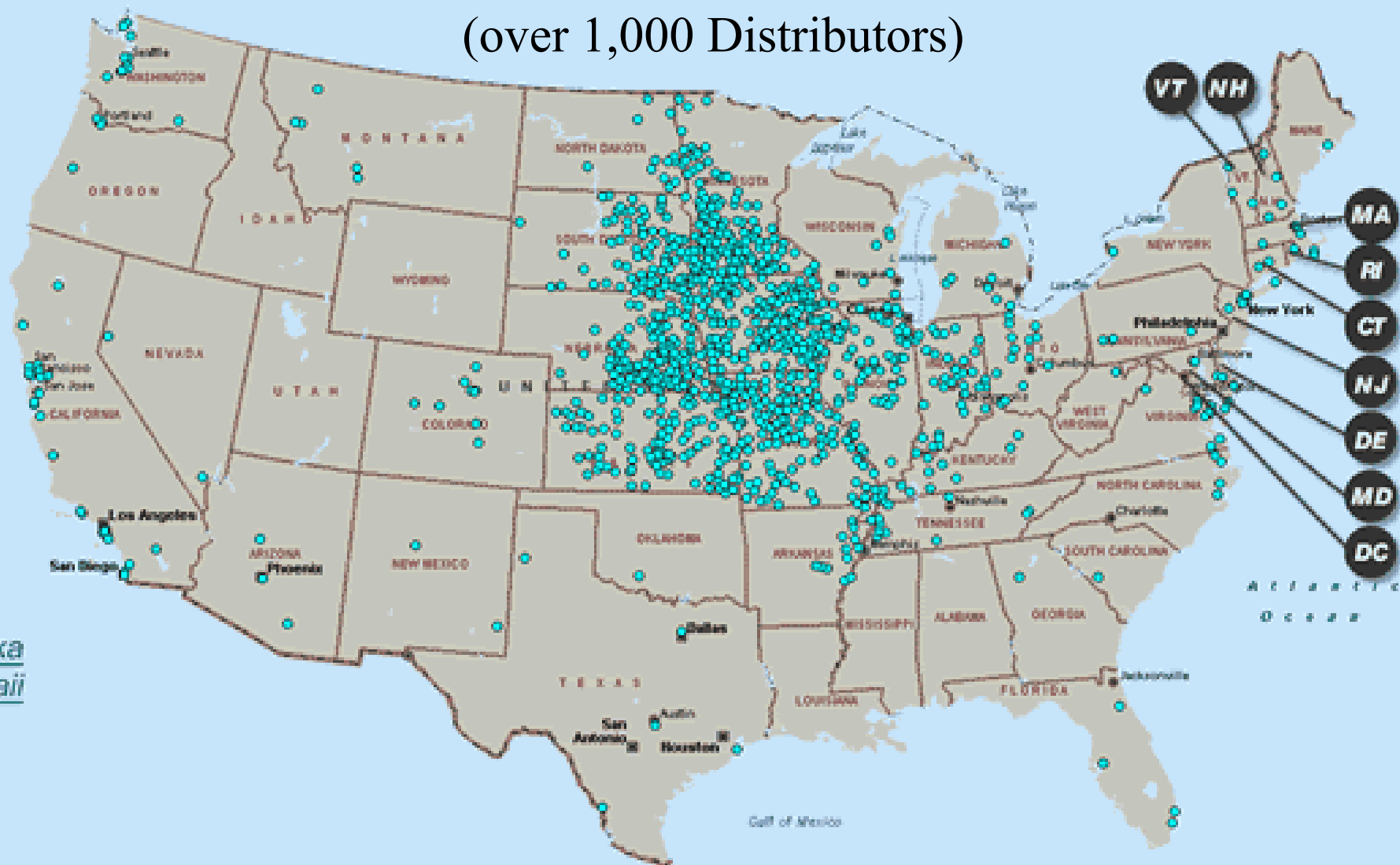
Biodiesel: Current Markets

- ◆ Heavy Duty On & Off Road Fleets
- ◆ Agricultural Industry
- ◆ Stationary Applications
- ◆ Construction & Mining companies
- ◆ Municipalities, Counties, Utilities
- ◆ Private citizens



Biodiesel: Distribution Locations

(over 1,000 Distributors)



Biodiesel: Users--CA

- ◆ **Federal Govt.:** 29 Palms; Travis AFB; Barstow Marine Corps Station; Vandenberg AFB; Port Hueneme Naval Base; Channel Islands Nat'l Park.
- ◆ **Utilities:** PG&E; SoCal Edison; SDG&E.
- ◆ **Municipalities:** City of Berkeley; Alameda Co.
- ◆ **Private Companies:** Fetzer Winery; Thanksgiving Coffee Co.; JR Cardenas Construction
- ◆ **Individuals:** Fuel cooperatives; card lock stations.



Biodiesel: Benefits

- ◆ Truly Renewable Fuel
- ◆ Distribution via Existing Infrastructure
- ◆ Improved Biodegradability
- ◆ Reduced Toxicity
- ◆ Reduces PM, VOC, & CO
- ◆ Lifecycle Greenhouse Gas Reductions
- ◆ Enhances Lubricity in Diesel & ULSD



Biodiesel: Identified Barriers

Four Major Categories

State & Local Policy

Emissions

Fuel Quality &
Retailing

Cost



Biodiesel: State & Local Policy

- ◆ State incentive programs do not account for benefits of biodiesel/blends.
- ◆ Requirements of new diesel PM regs. discourage use of biodiesel in covered fleets & applications.
- ◆ Inequitable state fuel tax policy.



Biodiesel: Fuel Quality & Retailing

- ◆ Concerns about fuel quality by OEM's, petroleum industry; engine warranty statements.
- ◆ Lack of general understanding & consistent definition of biodiesel.



Biodiesel: Emissions

- ◆ Concerns about biodiesel's NO_x emission profile.
- ◆ Uncertainties re: PM emissions & performance with diesel particulate filters.
- ◆ Perceived bias against diesel fuel hinders market development for biodiesel.



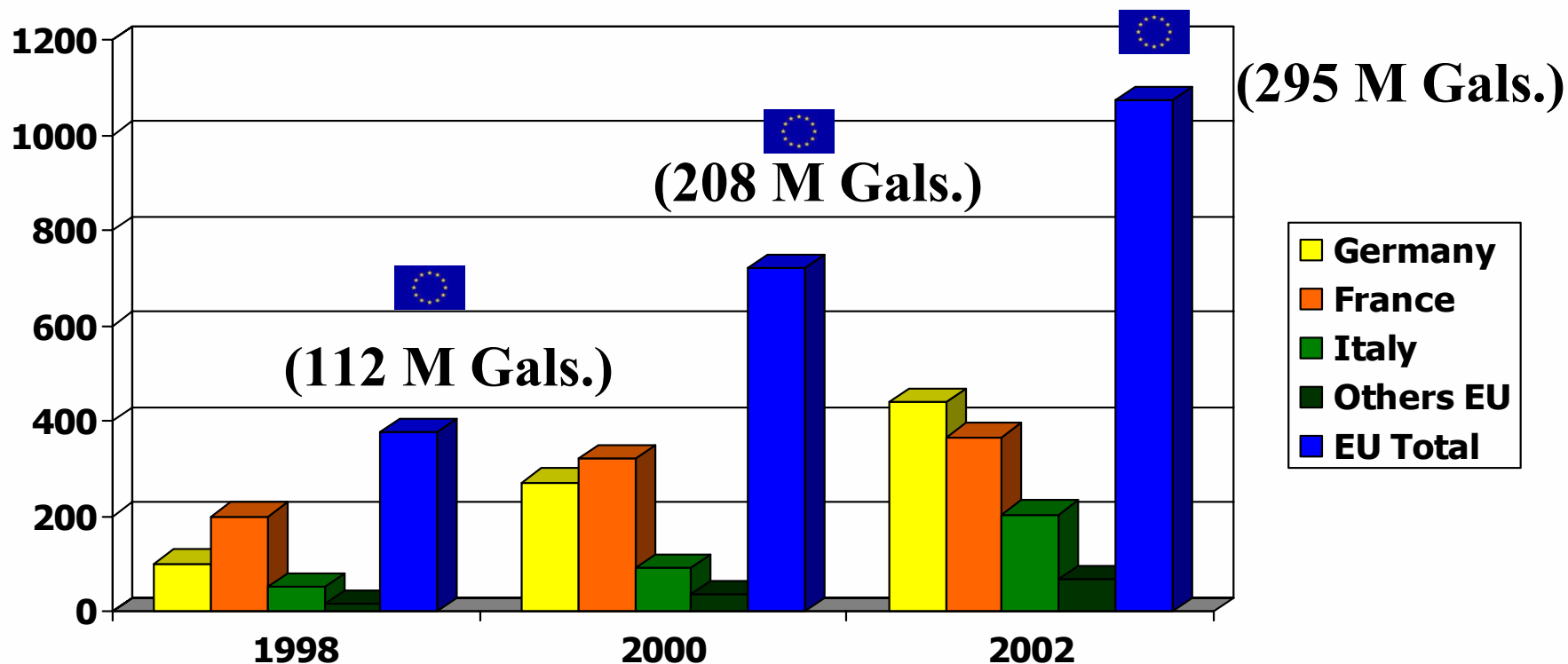
Biodiesel: Cost

- ◆ Incremental cost.
- ◆ Added expense for fuel handling & logistics increase price.



Biodiesel: European Market

EU Biodiesel production in Member States and in the EU ('000 t)



Biodiesel: U.S. Looking Forward

Current Potential: 1.7 Billion gals./biodiesel.

- ✓ Displaces 5.5% of national on-hwy. demand.

Near-Term Potential: (2015): 3.5 Billion gals./biodiesel.

- ✓ Displaces 6.8% of national on-hwy. demand.

Long-Term Potential: (2030): 10 Billion gals./biodiesel.

(Source: NREL; Biomass Oil Analysis: Research Needs & Recommendations. June 2004)



Biodiesel: CA Looking Forward

Base Case Assumptions

- ◆ Finalize additional ASTM fuel specs.
- ◆ Develop integrated state policy supporting biodiesel use.
- ◆ Federal biodiesel incentives.
- ◆ Collaborate with industry to optimize biodiesel performance.



Biodiesel: CA Market Projections

Base Case

(Gallons/year)	Diesel	B100	% Redux
2010	3.3B	10-30M	1%
2020	3.84B	40-80M	2%



Biodiesel: CA Looking Forward

Aggressive Scenario Assumptions

- ◆ Incorporate Base Case Scenario actions & assumptions.
- ◆ Aggressively address incremental costs:
 - Extend/expand federal tax incentives that encourage higher blend availability at the rack.
 - Implement favorable state tax policies that attract more oleochemical/biodiesel production.
- ◆ Support a national or state renewable fuel standard.
- ◆ Incorporate higher blends across the entire state diesel pool.



Biodiesel: CA Market Projections

Aggressive Case

(Gallons/year)	Diesel	B100	% Redux
2010	3.3B	35-65M	2%
2020	3.84B	300- 700M	18-20%



Biodiesel: Conclusion

- ◆ Biodiesel is the fastest growing alt. fuel in the US because it is simple and transparent.
- ◆ As proven in Europe, and b/c of its versatility, biodiesel has tremendous potential to displace petroleum gals. w/o displacing existing petroleum businesses.
- ◆ Aggressive public policy support for biodiesel will help maximize its potential in California.



Biodiesel: Sources

- ◆ Biomass Oil Analysis: Research Needs and Recommendations; NREL, June 2004.
- ◆ New Markets for Bio-Based Energy & Industrial Feedstocks. “Biodiesel-Will There Be Enough?”; John Campbell, February 2000. (USDA Ag Outlook Forum 2000)
- ◆ Biodiesel’s Role in California’s Energy Crisis; Russ Teall, 2001. (US Dept. of Energy)
- ◆ 2003 Integrated Energy Policy Report; CA Energy Commission
- ◆ The World-wide Development of Biodiesel & the European Experience; Claudio Rocchietta-European Biodiesel Board; (World Biofuels Conference 2003).

